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**XP - N2002-339714**

**AB - JP2002103510 NOVELTY - A gypsum board with antibacterial and gas adsorbing properties is obtained through the uniting and molding of a base paper and slurry containing calcined gypsum, an artificial zeolite composition substituted with iron, calcium, or magnesium ions and loaded with antibacterial cations, and water.**

**- DETAILED DESCRIPTION - A gypsum board with antibacterial and gas adsorbing properties which is obtained by supplying calcined gypsum slurry from a main mixer to lower base paper for gypsum board, placing an upper base paper for gypsum board on the slurry, and molding the laminate is a united and molded product of base paper and slurry containing calcined gypsum, an artificial zeolite composition substituted with iron, calcium, or magnesium ions and loaded with antibacterial cations, and water.**

**- USE - The gypsum board is used as an interior wall material.**

**- ADVANTAGE - The gypsum board is mildew-proof and removes odors and harmful gases.**

**- (Dwg.0/0)**

**IW - GYPSUM BOARD PRODUCE ANTIBACTERIAL GAS ADSORB PROPERTIES INTERIOR WALL MATERIAL COMPRISE UNITE MOULD BASE PAPER CALCINE GYPSUM SLURRY**

**IKW - GYPSUM BOARD PRODUCE ANTIBACTERIAL GAS ADSORB PROPERTIES INTERIOR WALL MATERIAL COMPRISE UNITE MOULD BASE PAPER CALCINE GYPSUM SLURRY**

**NC - 001**

**OPD - 2000-09-29**

**ORD - 2002-04-09**

**PAW - (SAKA-I) SAKANOUE K**

**TI - Gypsum board production with antibacterial and gas adsorbing properties, for use as interior wall materials, comprises uniting and molding of base paper and calcined gypsum slurry**

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# PATENT ABSTRACTS OF JAPAN

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(54) GYPSUM BOARD HAVING ANTIBACTERIAL PROPERTIES AND GAS ADSORBABILITY,  
AND METHOD FOR MANUFACTURING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a gypsum board having antibacterial properties and gas adsorbability by reutilizing waste containing a silicic acid component and/or an aluminum component.

SOLUTION: An artificial zeolite composition is synthesized from waste containing a silicic acid component and/or an aluminum component to be substituted with polyvalent cations, and antibacterial cations are further supported on this composition. The resulting composition is mixed with a baked gypsum slurry and/or raw material to provide a gypsum board having antibacterial properties and gas adsorbability.

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## CLAIMS

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[Claim(s)]

[Claim 1] In the plaster board formed through between briquetting machines after supplying the exsiccated gypsum slurry on the stencil for plaster board of lower paper from the main mixer and arranging the stencil for plaster board of an overlay on this slurry Exsiccated gypsum and the thing which carried out adsorption support of the antibacterial cation at the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion, Plaster board equipped with antibacterial [ which is characterized by having really joined and casting with a stencil what mixed water and was made into the slurry ], and gas adsorption nature.

[Claim 2] Plaster board equipped with antibacterial [ which made what carried out adsorption support of the antibacterial cation mix in the artificial zeolite constituent permuted by either / at least / the overlay of the stencil for plaster board, or lower paper with iron ion, calcium ion, or magnesium ion 5 to 50% / according to claim 1 ], and gas adsorption nature.

[Claim 3] Plaster board which equipped the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion with antibacterial [ the antibacterial cation which carries out adsorption support is / antibacterial / in any of complex ion a copper ion zinc ion, tin ion, cadmium ion, and nickel ion / according to claim 1 to 2 ], and gas adsorption nature.

[Claim 4] Plaster board equipped with antibacterial [ from which an artificial zeolite constituent carries out hydrothermal synthesis of the trash containing a silicic acid component and/, or an aluminum component, and is obtained / according to claim 1 to 3 ], and gas adsorption nature.

[Claim 5] The thing and water which blended with exsiccated gypsum what carried out adsorption support of the antibacterial cation are mixed to the artificial zeolite constituent permuted by any of iron ion, calcium ion, and the magnesium ion they are. The obtained exsiccated gypsum slurry is supplied on the stencil for plaster board of lower paper from the main mixer. The manufacture approach of the plaster board equipped with antibacterial [ which is characterized by really joining to a stencil and casting through between making machines after arranging the stencil for plaster board of an overlay on this exsiccated gypsum slurry ], and gas adsorption nature.

[Claim 6] The manufacture approach of the plaster board equipped with antibacterial [ which makes what carried out adsorption support of the antibacterial cation mix in the artificial zeolite constituent permuted by either / at least / the overlay of the stencil for plaster board, or lower paper with iron ion, calcium ion, or magnesium ion 5 to 50% / according to claim 5 ], and gas adsorption nature.

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## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention reuses the trash which is rich in a silicic acid component and an aluminum component, Iron ion, calcium ion, or magnesium ion permutes the artificial zeolite constituent heated, or pressurized and obtained under alkali conditions, what carried out adsorption support of the antibacterial cation further is blended with exsiccated gypsum, and it is related with the odor removal (gas adsorption nature) and the plaster board excellent in gas conditioning nature which really joined and cast with the stencil the exsiccated gypsum slurry which was mixed with water and obtained.

[0002]

[Description of the Prior Art] Conventionally, by the gypsum-fibrosum boat used as building materials, the thing equipped with gas conditioning nature and deodorization nature is known, and what used non-subtlety fine particles, a water soluble polymer, and carbide as gas conditioning material or deodorization material is indicated by JP,2000-045450,A.

[0003]

[Problem(s) to be Solved by the Invention] However, in the conventional plaster board, the chemical admixture of different-species construction material with which applications differed had to be mixed, it had to be made to mix in an exsiccated gypsum slurry, and there was a problem also from the field of reinforcement, the engine performance, and a manufacturing cost.

[0004]

[Means for Solving the Problem] The invention in this application is accomplished in order to attain the above-mentioned object. Invention of claim 1 In the plaster board formed through between briquetting machines after supplying the exsiccated gypsum slurry on the stencil for plaster board of lower paper from the main mixer and arranging the stencil for plaster board of an overlay on this slurry The thing and water which carried out adsorption support of the antibacterial cation are mixed to the artificial zeolite constituent which \*\*(ed) with exsiccated gypsum, iron ion or calcium ion, or magnesium ion. Plaster board equipped with antibacterial [ which is characterized by having really joined and casting with a stencil what was made into the slurry ], and gas adsorption nature.

[0005] Claim 2 is the plaster board equipped with antibacterial [ which made what carried out adsorption support of the antibacterial cation mix in the artificial zeolite constituent permuted by either / at least / the overlay of the stencil for plaster board, or lower paper with iron ion, calcium ion, or magnesium ion 5 to 50% / according to claim 1 ], and gas adsorption nature.

[0006] Claim 3 is the plaster board which equipped the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion with antibacterial [ the antibacterial cation which carries out adsorption support is / antibacterial / in any of complex ion, a copper ion, zinc ion tin ion, cadmium ion, and nickel ion / according to claim 1 to 2 ], and gas adsorption nature.

[0007] Claim 4 is the plaster board equipped with antibacterial [ from which an artificial zeolite constituent carries out hydrothermal synthesis of the trash containing a silicic acid component and/, or an aluminum component, and is obtained / according to claim 1 to 3 ], and gas adsorption nature.

[0008] Claim 5 mixes the thing and water which blended with exsiccated gypsum what carried out adsorption support of the antibacterial cation to the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion. The obtained exsiccated gypsum slurry is supplied on the stencil for plaster board of lower paper from the main mixer. The manufacture approach of the plaster board equipped with antibacterial [ which is characterized by really joining to a stencil and casting through between making machines after arranging the stencil for plaster board of an overlay on this exsiccated gypsum slurry ], and gas adsorption nature.

[0009] Claim 6 is the manufacture approach of the plaster board equipped with antibacterial [ which makes what carried out adsorption support of the antibacterial cation mix in the artificial zeolite constituent permuted by either / at least / the overlay of the stencil for plaster board, or lower paper with iron ion, calcium ion, or magnesium ion 5 to 50% / according to claim 5 ], and gas adsorption nature.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. the exsiccated gypsum which uses as the main raw material the plaster board stated to this invention – iron ion – or What carried out adsorption support of the antibacterial cation is blended with the artificial zeolite constituent

permuted with calcium ion or magnesium ion 5 to 50% by weight %. What added water and was made into the slurry is supplied on the stencil for plaster board of lower paper from the main mixer, after arranging the stencil for plaster board of an overlay on this, between making machines is let pass and dried [ harden and ], and it really joins to a stencil. Having made the content of the aforementioned artificial zeolite constituent into 5 - 50% by weight % makes 50% the upper limit which gets used the minimum to which antibacterial and the gas adsorption effectiveness show up with the stencil of the above [ the slurry which mixed the artificial zeolite constituent 5% ] by mixing the aforementioned artificial zeolite constituent.

[0011] The artificial zeolite constituent stated to this invention is a resultant which was made to heat, or pressurize and react under alkali conditions, and was acquired after adjusting the \*\*\*\* ratio of the trash containing a silicic acid component and/or an aluminum component. The alkali water solution when mixing the aforementioned artificial zeolite is used as water solutions, such as the matter which is the hydroxide of alkali metal and dissolves in water, for example, a sodium hydroxide, a potassium hydroxide, a calcium hydroxide, a barium hydroxide, and a lithium hydroxide, and the bottom of the aforementioned alkali condition says performing alkali concentration of reaction time 0.5 thru/or in 4.5 Ns. Moreover, an artificial zeolite constituent is compoundable by heating at 80-230 degrees C as heating conditions for reaction time, or making it pressurize and generate heat using maximum vapor tension.

[0012] It is a hydroxy soda light, a FIRIPPU site, the faujasite that the principal component of said zeolite constituent changes by the \*\*\*\* ratio of a raw material, x1.7 [ i.e., (ratio of the weight composition of SiO<sub>2</sub> and aluminum 2O<sub>3</sub>), ], and are generated as a principal component. moreover -- as components other than a principal component -- Zeolite A etc. -- little \*\*\*\* -- there are also things and an intermediate product until it results in the impurity and zeolite of the activated carbon allied substances of the non-burned carbon origin, iron, and others etc. lives together as a non-zeolite component.

[0013] The artificial zeolite constituent permuted with iron ion, aforementioned calcium ion, or aforementioned magnesium ion is immersed in the water solution of each aforementioned cation, an artificial zeolite constituent is obtained, and adsorbent increases it also not only to cationicity but to the Nonion nature and anionic gas. The increment in this adsorption capacity force is based on the bridge formation effectiveness and the chelate generation effectiveness of a multiple-valued cation, and is [ using a univalent cation rather than ] desirable.

[0014] After being immersed and making an artificial zeolite permute in the water solution of each aforementioned metal cation content with what carried out adsorption support with the antibacterial cation to the artificial zeolite constituent permuted with the iron ion stated to this invention, calcium ion, or magnesium ion, adsorption support of the antibacterial cation is carried out further. As an antibacterial cation, although complex ion, a copper ion, zinc ion, tin ion, cadmium ion, and nickel ion are illustrated, if the effect (toxicity) on an environment and the body is taken into consideration, it is desirable to use complex ion, a copper ion, and zinc ion.

[0015] What carried out adsorption support of the antibacterial cation is liked 5 to 50% to the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion, and is made crowded with weight % in it at least with the stencil for plaster board stated to this invention at the paper fiber in the production process of the stencil for plaster board. the plaster board of this invention -- exsiccated gypsum and iron ion -- or The thing which made the artificial zeolite constituent permuted with calcium ion or magnesium ion carry out adsorption support of the antibacterial cation further, Mix both water and what was made into the slurry is supplied on the stencil for plaster board of lower paper from the main mixer. Next, after arranging the stencil for plaster board of an overlay on this, plaster board is formed through between making machines, and after hardening of exsiccated gypsum, at a desiccation process, excessive moisture is removed and it is manufactured.

[0016] The manufacture approach of the plaster board equipped with antibacterial [ of this invention ], and gas adsorption nature In the plaster board formed through between briquetting machines after supplying the exsiccated gypsum slurry on the stencil for plaster board of lower paper from the main mixer and arranging the stencil for plaster board of an overlay on this slurry The thing and water which carried out adsorption support of the antibacterial cation are mixed to the artificial zeolite constituent which \*\*(ed) with exsiccated gypsum, iron ion or calcium ion, or magnesium ion, with a stencil, it really joins and what was made into the slurry is cast. Moreover, it is desirable to use for the paper fiber in the production process of said stencil the thing which what carried out adsorption support of the antibacterial cation was liked [ thing ] 5 to 50% to the artificial zeolite constituent permuted with iron ion, calcium ion, or magnesium ion at least, and made it crowded with weight % in it as a stencil for plaster board. Next, although the example which used the plaster board of this invention for the wall surface of a food storage is shown, the plaster board of this invention is not limited to this example.

Moreover, the aforementioned artificial zeolite can be mixed with diatomaceous earth, and a diatom board can be manufactured by processing like the aforementioned plaster board.

[0017]

[Example] the autoclave with an agitator of 1 liter capacity (Oriental high voltage incorporated company make) – an ultrasonic transmitter (Made in the NIPPON SEIKI Factory –) Molybdenum DEL US-600T are installed and the content of the aluminum silicate of amorphous nature is 95% at this reaction container. the fly ash (made in the Electric Power Development Co., Ltd. Matsuura electric power plant –) of \*\*\*\*\* 2.5 It is saturated steam, oscillating a 25kHz supersonic wave by 600W, after putting 1kg of acquisition into a proof-pressure reaction container, putting in 10l. of 4-N sodium-hydroxide water solutions from on the and shutting a lid from a fly ash association. It pressurized, and it heated until internal temperature amounted to 120 degrees C. After maintaining this condition for 3 hours, the steam was extracted, it returned to atmospheric pressure, and the artificial zeolite constituent was taken out.

[0018] When the aforementioned resultant was rinsed and the X diffraction was performed after the air dried, the artificial zeolite constituent which makes a FIRIPPU site a subject was generating, and the cation exchange capacity of the constituent concerned was 350cmol(+) kg-1. next, the calcium chloride water solution with a concentration of 0.5 mols was added, and by both-way \*\*\*\* and \*\*\*\*\*, the artificial zeolite constituent which the above generated was obtained silently, and was carried out for 2 hours. After repeating this processing 5 times and carrying out rinsing clearance of the superfluous salt according to centrifugal separation, it dried at 150 degrees C and the artificial zeolite constituent of a calcium permutation mold was adjusted. Next, the artificial zeolite constituent of the aforementioned calcium permutation mold was dried at 105 degrees C, after being immersed in the copper-sulfate water solution with a concentration of 0.2 Ns for 1 hour, and the thing which made the calcium permutation mold artificial zeolite constituent support a copper ion was prepared.

[0019] The thing which made 5% of calcium permutation mold artificial zeolite constituent support a copper ion to the weight of exsiccated gypsum is mixed, and water is added. What was made into the slurry was supplied from the main mixer on the stencil for plaster board of lower paper (the thing which made 5% of calcium permutation mold artificial zeolite constituent support a copper ion to the weight of stencil fiber is mixed), and after arranging the stencil for plaster board of an overlay on this slurry, plaster board was created through between briqueting machines.

[0020] The food storage (volume 1m<sup>3</sup>) which installed the aforementioned plaster board in the internal surface, and the plaster board which is not using the aforementioned zeolite constituent were prepared, banana 1 fringe (20) was put into each interior of a room, at the room temperature of 25 degrees C, one-week preservation and neglect were performed and aging of ethylene gas concentration which affects the freshness of a banana was shown in a table 1.

[0021]

[A table 1]

エチレンガス濃度

	0日目	1日目	2日目	3日目	4日目	5日目	6日目
人工ゼオライト 組成物混合	0 ppm	0.3 ppm	0.5 ppm	1.8 ppm	2.6 ppm	6.2 ppm	10.4 ppm
人工ゼオライト 組成物なし	0 ppm	1.0 ppm	1.5 ppm	3.3 ppm	5.3 ppm	13.1 ppm	15.0 ppm

Although the concentration of the ethylene gas in a food storage was increasing rapidly from the event of two days passing as shown in a table 1, the ethylene gas concentration of the storage interior of a room of the plaster board which used the aforementioned artificial zeolite constituent was lower than the case where an artificial zeolite is not used.

[0022] About the average of the pulp degree of hardness of a banana, immediately after preservation was 2.00kg, the pulp degree of hardness after one-week progress is 0.55kg from the banana of the stockroom of the plaster board which does not use an artificial zeolite constituent to being 1.06kg from the banana of the stockroom of the plaster board which used the aforementioned artificial zeolite constituent, and when the artificial zeolite constituent in plaster board adsorbed ethylene gas, having held the freshness of a banana was admitted. Moreover, with the wall of the stockroom which used the plaster board of this invention, although generating of mold was not accepted, with the wall of the stockroom which used the plaster board with which the artificial zeolite constituent is not used, mold occurred in several places and it was checked that the plaster

board of this invention is effective also to mold.

[0023]

[Effect of the Invention] If the plaster board of this invention is used for inner package material etc. like the above, an odor, harmful gas, etc. which mold does not occur on the wall surface of an inner package, and occur indoors can be removed, and it will also be providing with a new technique further a deployment of the trash generated from the industrial world and a nature.